Mid-term EX1 Solutions

1- Initial velocity = 10m/s, final velocity = 0, acceleration = -4m/s^2

Use the V^2 law to find Δx

2- Differentiate each equation to find the velocity of each car

Equalize the two velocities to find t

3- Initial velocity = +4.9m/s, final velocity = -14.7, acceleration = -9.8m/s^2

Use the first equation of motion Table 2.2 but a changed to g

4- Initial velocity = 0, final velocity = ?, time = 2s, Δx = 5 m

Use the second equation of motion table 2.2

5- A = 3(5i + 3j) –(2i +j -7k)

= 13i +10j -7k

Magnitude of A = $(13^2 + 10^2 + (-7)^2)^{1/2}$

6- Radius r = 2 cm, 4rev/s, a?

T = 1/4 = 0.25 s

$v = 2\pi r/T$

$a = v^2/r$

7- along the x coordinate:

Initial velocity is = 0, a = 4 m/s^2, Δx = 32 m

Use the v^2 equation to find the final velocity

Use the final velocity to find the time t

The time t is a common factor between the motion along the x coordinates and the y coordinate

Now along the y coordinate:

Initial velocity is 8 m/s, a = 2 m/s^2 and the time is calculated

Δy is found using the the third equation table 2.2

8- v_{yi} = 0, acceleration is 9.8 m/s^2 and Δy = 400 m

Using the sign notation we can find the time t for the bomb to reach the ground

Δx = (300t) m

9- Total distance = 100x5x60 + 150x10x60 + 50x5x60 = 135000 m

Displacement: R_x = 100x5x60 +150x10x60cos45

R_y = 150x10x60sin45 - 50x5x60

Tanϑ = R_y/R_x